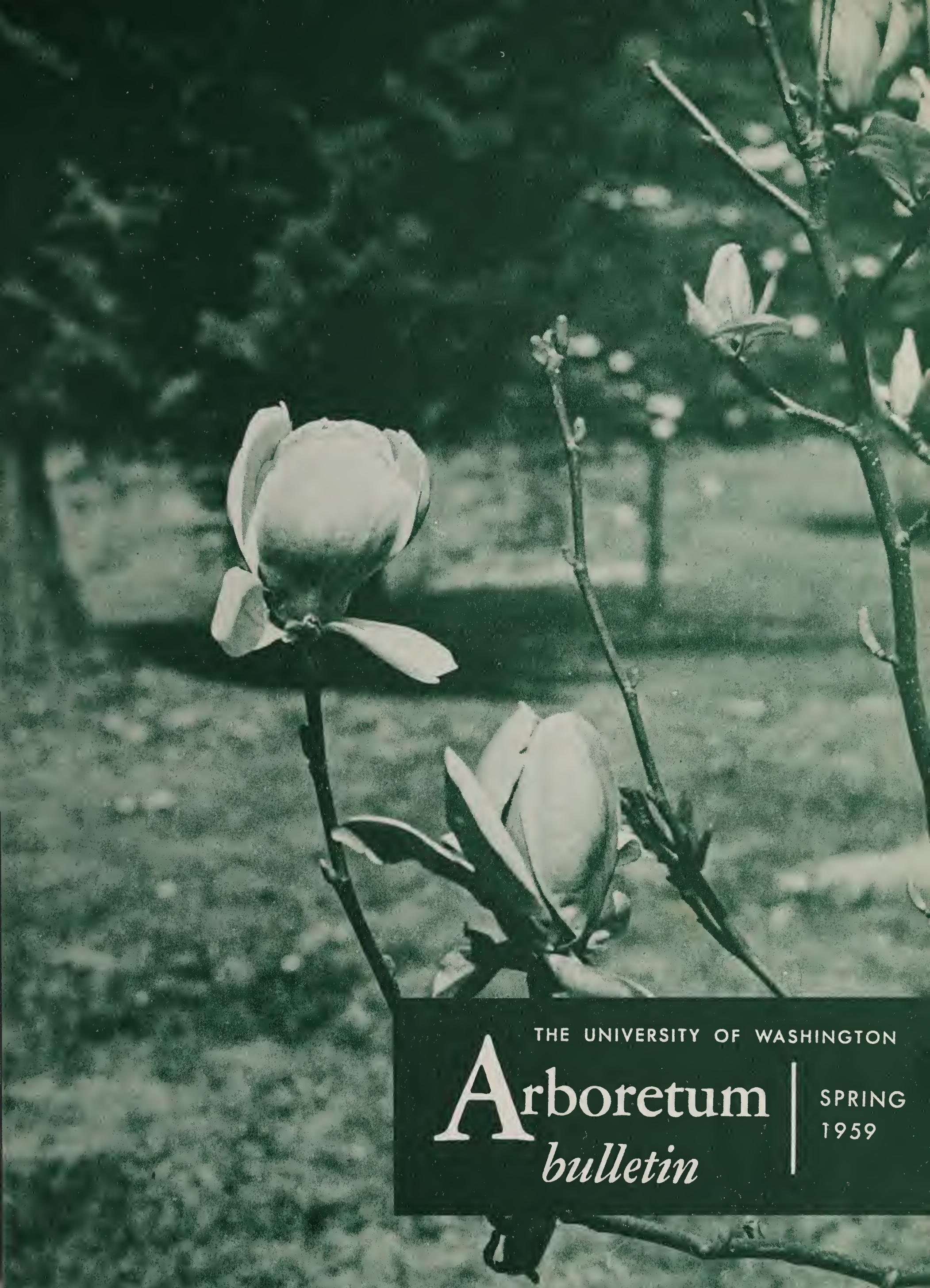

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Arboretum *bulletin*

SPRING 1959

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Arboretum bulletin

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COVER PHOTO: *Magnolia Soulangiana* var. *Lennei*

Educational Program of the Brooklyn Botanic Garden

Elizabeth Jane Townsend*

A VISITOR to the Brooklyn Botanic Garden in New York City expresseed questioning surprise one day at the numbers of people on the grounds. These people included a fourth grade class gathering "itchy balls" under a sycamore tree, a small group of women painting in the Rose Garden, and a study group in the Woodland Garden. His questions could be answered in a phrase: popular public education.

The Brooklyn Botanic Garden and Arboretum, one of something over 100 of the better known public gardens and arboretums in the United States, contains a collection of plants from all over the world on 50 acres of land in the heart of New York City's giant borough of Brooklyn. Like any botanical garden, the plants are largely systematically arranged by family and labeled for purposes of identification and use. Landscaping has made the Brooklyn Garden into "a garden of many gardens." Of these small rather intimate gardens the best known are the Japanese Garden and the Garden for the Blind. The entire botanic garden presents an unusual sanctuary for city dwellers and others who come from far places.

Leaving the grounds, a living museum of trees and shrubs, and going into the administration building, one finds an herbarium, a library of thousands of books and periodicals, laboratories where scientific research is in progress, an auditorium seating 400 people, and many classrooms. Thus, in all senses, the Brooklyn Botanic Garden carries on a botanic garden's role—it is a place of beauty, a place of research, and a place of popular learning.

In this last respect, the role of education, the Brooklyn Botanic Garden has enlarged upon the traditional picture of a public garden and arboretum. People use every part of it, not merely as passive spectators at cherry blossom time or at the height of the magnolia season, but as active students of plant life. Ever since the Garden was founded in 1910, education for the lay person has played an increasingly important part in its activities. 1913 saw the first popular courses given by the Garden. And the following year witnessed the start of a summer program for children. In 1914, too, 27,000 penny seed packets were prepared for distribution to school children, for home and classroom gardens. These pioneer programs have flourished. In 1958 well over a thousand adults took 28 different courses made up of 45 sections. The summer gardens for children have tripled in enrollment. And in addition, nearly 20,000 children came from public and private schools for special popular classes and approximately a million packets of seeds were sent out to the children in the schools.

Today, the education program covers three main spheres: the popular courses for adults, the children's summer garden program followed by Saturday classes in the winter, and an instruction program for visiting classes from schools in the Greater New York area. It should be mentioned that in conjunction with the New York City Board of Education, two "in-service" courses, entitled "Growing Plants in the Classroom" and "Gardening Indoors and Out," are given to city teachers to encourage and promote interest in the plant world.

On a national level, the Garden publishes the quarterly PLANTS & GARDENS, a compact handbook for gardeners. Each issue is devoted to one aspect of gardening (Pruning, Herbs, Gardening in Containers, Roses, etc.). An annual digest number is also included which presents outstanding articles of interest to the gardener and amateur horticulturist that have appeared in other horticultural

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*Instructor on the staff of the Botanic Garden.

This is the second in our series on this subject.

magazines, books, and experiment station bulletins. PLANTS & GARDENS is circulated to all the members of the Garden and to several thousand people throughout the United States and in thirty foreign countries.

For the average citizen, the Garden's aim is to foster and bring to their attention the recreational aspects of gardening by offering courses on all facets of horticulture which can provide hobbies for urban and suburban dwellers. The philosophy of learning-by-doing is basic to all the courses. *Spring Gardening Begins Indoors,* a very popular course, exemplifies how this course system is effected. There are three sections of *Spring Gardening,* two mornings and one evening, each meeting once a week. The day sessions attract the housewife and those retired from business, while the night sessions draw on the business and professional groups. The course itself is only five weeks long—long enough to teach, to stimulate and to encourage but not long enough to dull the interest and excitement of the group. Hence, all of the courses are of short duration, lasting anywhere from three to eight weeks. In *Spring Gardening,* people learn how to raise flowers from seed; when and how to sow, and what flowers and arrangement to use in the flower garden. A lecture with demonstration or slides precedes actual work in the greenhouse where the student puts to practice the techniques discussed. At the end of the course, be he neophyte or experienced gardener, he proudly takes home several flats of plants he has grown. The subjects of the courses are as varied as are the people who come to take them. For the city gardener, *Houseplants* has always been a popular course. For those with summer places or who live outside the city, *Home Landscaping, Lawn Care,* and *Pruning Methods* are courses repeated again and again. *Flower Painting, Seedpod Craft,* and *Flower Arrangement* attract those with artistic talent. The naturalist finds to his liking the courses on wildflowers and on identifying trees in winter. Even traditional botany is not neglected. *Exploring the Plant Kingdom* and *Families of Plants* were two "botanical" courses geared for the enthusiastic, nonscientific layman. Two hundred people (in four different sections) have just finished courses in Bonsai—the Japanese horticultural art of training and growing miniature trees in containers.

At the other end of the age scale, the children. The educational program places equal emphasis on plants as a science and plants for a hobby. Elementary school children come to the Garden (in class groups) for lessons that supplement their regular school work. Many of these children come from poor environments. For them, potting up a coleus plant in the greenhouse or taking a guided walk around the grounds, where they find themselves surrounded by sheer beauty, is a unique and meaningful experience. For them, working just a time or two with plants opens up new horizons. Their thank-yous at the end of a lesson are touchingly sincere. Many classes come for a "greenhouse series," a set of four lessons. In the lecture room, simple plant experiments, demonstrations and models help tell the story and show the endless variety of the plant kingdom and the importance of plants to man. In the greenhouse, the children make cuttings, plant bulbs, make desert gardens—and take them back to school and home.

Summertime takes the instruction staff outside to the Children's Garden. Here 400 children from the fourth grade through high school tend vegetable and flower gardens. It is a hubbub of activity with children raking, pulling weeds, weighing their crops, and sometimes running away from a surprised snake. Two children work on each 10 x 10 garden plot; it is theirs from the first sowing to the last harvest. At the end of the summer ribbons and medals are awarded to children who have studied special little projects about insects, soils, flower families, etc. In the fall as they return to school they become members of the Saturday Morning Club at the Garden. Again more greenhouse and classroom work combines botany and horticulture effectively. Children think the program is great

(Continued on Page 25)

Ponderosa Pine

(Pinus ponderosa)

C. Frank Brockman*

DOUBTLESS this tree is familiar to more residents of western North America than any other conifer, for it is commonly found in every state west of the Dakotas and Nebraska, as well as in portions of British Columbia and old Mexico. In the Pacific Northwest it is typical of the area east of the Cascades, where it is generally found in mixture with lodgepole pine *(Pinus contorta)* and western larch *(Larix occidentalis)*. However, a few native specimens may be noted in the Puget Sound basin on the Ft. Lewis prairie; the porous, gravelly soils, typical of that area, deposited by glaciers which once extended into that region, are responsible for localized conditions suited to the growth and development of this species.

Ponderosa pine is a handsome tree, particularly after it attains maturity. At that time the trunk is typified by large, irregular plates of cinnamon-brown bark separated by deep fissures. Another distinctive feature of the bark of mature trees is the fact that its surface is broken up into numerous irregularly-shaped scales which fit together like pieces of a jig-saw puzzle. Mature pines normally attain a height of from 150 to 175 feet and a diameter of from 3 to 4 feet (fig. 1).

The needle-like, dark green foliage of ponderosa pine varies in length from 5 to 11 inches and is borne in "bundles" of three (occasionally two) needles. This fact alone makes it easy to distinguish the ponderosa pine from the other pines native to the State of Washington; lodgepole pine bears its needles two per bundle, while both western white and whitebark pine are characterized by "bundles" of five needles. The distinctive cones of ponderosa pine are from three to six inches long, ovoid to ellipsoidal in shape, and the woody scales are armed at the apex with a sharp, slender and usually out-pointed prickle. These cones are produced singly or clustered upon the branches and when they drop from the tree often leave a rosette of basal scales attached to the branch.

Commercially, ponderosa pine is one of the most important native coniferous species. The fine grained wood is widely used for interior finish, sash and doors, match blocks, crates and boxes, general construction and related uses. Botanically it is grouped with the "hard" or "Pitch" pines and originally was commonly referred to as western yellow pine. However, use of that term occasionally caused this tree to be confused with the yellow pines of southeastern United States which are characterized by harder, more resinous wood; as a result, ponderosa pine has been accepted as the common name of this species.

Ponderosa pine was first reported by the Lewis and Clark Expedition who saw it in 1804 in the upper Missouri country; the specific name, "ponderosa," was suggested some twenty years later by David Douglas because of the large size of trees which he observed about that time in the eastern part of what is now the State of Washington.

In addition to its importance as a commercial timber producing species the ponderosa pine is well adapted to landscape plantings. Being a "hard" pine it is not subject to damage by blister rust — the introduced fungus disease which has wrought such havoc among 5-needled "soft" pines throughout many sections of our country. But like all trees—in fact, like all living things—ponderosa pine is subject to damage by a number of enemies. In addition to fire, extensive areas of this species are often destroyed by epidemic attacks

(Continued on Page 25)

*Professor Forestry, University of Washington.

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Pinus ponderosa at Pyramid Peak campground, Highway 50, Eldorado Co., California.

FIG. 1 PHOTO BY B. O. MULLIGAN

Some Aspects of Pollination

B. J. D. MEEUSE*

A TRUE GARDENER is an artist; more than most other people, he realizes that beauty can manifest itself in an untold number of ways and not just in colors and shapes. This has given me the courage to discuss in this garden journal the interesting relationships that exist between flowers and their animal friends, the pollinators. It is my sincere conviction that a study of these ties will make a garden an even more delightful place than it already is in the eyes of the "aficionado." It will add a new dimension to his hobby.

Pollination, as a practical procedure, must have been discovered by the ancient, date-growing peoples of the near East. As everyone knows, there are separate male and female date palms, the former producing only pollen grains, the latter bearing the ovules that will give rise to the seeds. Normally, pollination is carried out by the wind, and when the number of male and female trees is about equal, there is no problem; however, when the females outnumber the males (as is usually the case), it is advantageous to cut off a male inflorescence and to shake it back and forth in the vicinity of the female trees so that the pollen may be scattered. A relief dating back to the days of King Asur-nasir-pal (860 B.C.) shows that the ancient Assyrians were familiar with this practice. We have good reason to believe that the King himself sometimes performed the duties carried out by the deities depicted. Likewise, we must assume that the Mediterranean peoples had at least an inkling of the complicated pollination situation in figs, where minute gall-wasps play a role. Unfortunately, in Western Europe the truth soon became corrupted, and in the dark Middle Ages it was completely lost. Thus, the pollination story with which every school child nowadays is so familiar had to be rediscovered, and at the same time it had to be given a more scientific basis. Credit for this should go to a number of men, including Camerarius, Koelreuter and the great Swede, Linnaeus. However, it was Christian Conrad Sprengel (1750-1816) who, with that intuitive poetic insight which some people rightly call genius, has made the greatest contribution of all.

A deeply religious man, Sprengel was convinced that the wise Creator could not have produced the minutest hair on a leaf, the smallest color-patch on a petal, if it did not have a meaning or purpose. Studying the flower of a wild European Geranium in the year 1787, Sprengel was struck by the presence of a group of small, soft hairs on the inside and at the base of each petal. Asking himself, true to character, what the "meaning" of these hairs could be, he ventured the guess that there was a connection between them and the drops of sweet nectar which were also present, one at the base of each petal. Could it be that the Creator had intended these drops to attract insects? It would then be very logical that they had to be protected against rainwater which would make the sugar-syrup more dilute and thus less attractive. In modern language, Sprengel concluded that the function of the hairs was to protect the nectar drops against rainwater and the function of the nectar to make the flowers attractive for insects—the animals responsible for the process of cross-pollination.

In his studies of forget-me-not flowers, carried out the next year, Sprengel found that around the flower tube's entrance there was a yellow ring, standing out very strikingly against the blue of the petals. Sprengel thought of this yellow patch as a signpost, put there by the Creator to point the way to the nectar, which in this case is concealed deep in the flower tube. He found similar structures in many other flowers, sometimes as color patches, sometimes as systems of dots or lines (fig. 2). The accepted modern name

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for them, in Anglo-Saxon countries, is *honey-guides* or *nectar-guides*. Then, with impeccable logic, Sprengel made the next step; if the deviating color-patch in flowers such as forget-me-nots does indeed serve as a sign-post, then the color of the flower as a whole must also be appreciated by insects and must have the purpose of attracting them from afar.

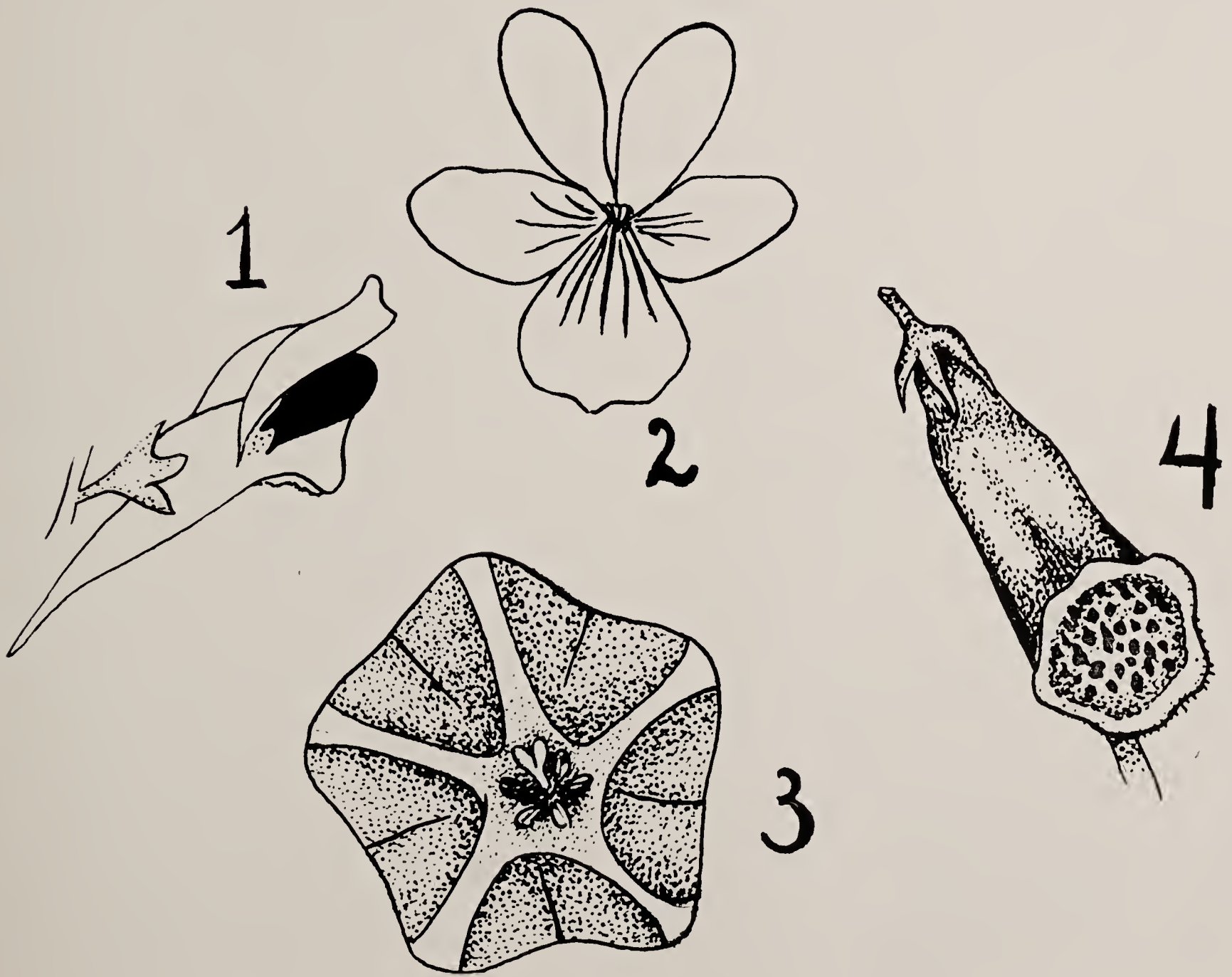
These and many other conclusions and observations are to be found in Sprengel's delightful book "Das entdeckte Geheimnissder Natur," or "The Secret of Nature Revealed," published in 1793. Aglow with the spirit of summer, humble and joyous at the same time, it makes it perfectly clear that Sprengel interpreted his discoveries as a revelation. It is deplorable that he did not immediately get the recognition which he so richly deserves, and had to die penniless and almost forgotten. Fortunately, the great Charles Darwin later became interested in the same field; with characteristic generosity, he has given Sprengel the prominent place in science which he still occupies today. Darwin himself, by writing a gem-like book on the pollination of orchids, has given great impetus to further developments in the field which took place under the leadership of such men as the Mullers, Delpino, Knuth and others. Most, if not all, of these investigators had implicit faith in Sprengel's theories. And yet, the critical modern thinker has to admit that Sprengel, for all his genius, did not really prove his point! Is it true that insects can distinquish between various colors and are attracted by some of them; do they really allow themselves to be led by honeyguides? Luckily, the answers to these (and many other) questions have been forthcoming in our own twentieth century. However, they came only as a result of a seesaw battle.

In 1912, Von Hess came out with sweeping statements to the effect that not only in-

Below:

Various types of Honeyguides: 1. Toadflax (color patch); 2. Violet (stripes); 3. Morning-Glory (spokes of wheel); 4. Foxglove (Dots).

FIG. 2 DRAWINGS BY DR. MEEUSE



sects but other Arthropods as well were utterly and completely colorblind and that further research in this field was superfluous. The dismay which this development caused in the ranks of the followers of Sprengel can easily be imagined. It is, therefore, fortunate that Von Hess's experiments were not above criticism. For instance, he put honeybees in a dark box and noticed that they had a strong tendency to move to the lightest spot, such as a slit in the box; when he varied the quality (the color) of the light entering the box, he found that the bees behaved just like completely colorblind humans. What is wrong with this setup? To put it in a nutshell, the influence of "mood" was not taken into account at all! The bees in the dark box were panicky, their reaction was an escape-reaction, and in this mood they were unwilling or unable to pay any heed to color quality. Of course this does not mean that in another experimental setup they could not have exhibited a perfectly good color sense! The bees were only psychologically colorblind.

How important this matter of "mood" is, was clearly demonstrated by myself in my student days, when I was working on the mating-behavior of the grayling, a European butterfly of the meadowbrown family. The mating-sequence is initiated when the males, sitting on the ground, begin to dart after moving objects such as falling leaves, dragonflies, birds, and other butterflies. Experiments with paper models tied to fishing-rods and moved around in a uniform fashion clearly showed that the males do not pay any heed to color. Yet, when a food-seeking mood was introduced these same butterflies by exposing them to perfumes such as lavender or heliotrope, they would spontaneously seek out various colored papers scattered around. Experiments with the famous Hering series of standard color papers, show that the grayling has a very definite preference for yellow and blue; red is confused with blacks and dark grays, which is tantamount to saying that the animal is red-blind. Also, there is a "leak" in the green region. This curve can be generalized for other insects. Many years earlier, Von Frisch had already demonstrated a similar color-sense in bees, and Knoll had done it for a very efficient pollinating fly, the fuzzy Bombylius.

Some comment is in order here. If bees and other insects are indeed red-blind, then what to think of the fact that red poppies are so abundantly visited by honeybees? The answer is a very interesting one; the insects are not attracted by the red color of the flowers, but by the ultraviolet light which they reflect! When poppy petals, in certain experiments, were covered with a filter that allowed the ultraviolet to go through but held back the red rays, the bees continued to visit them, although to the human observer the petals now were quite black!

There are other red European flowers, mostly in the pink family, which do not reflect the ultraviolet and which are insect-pollinated all the same. In this case, very special insects come to the rescue, namely the whites and the swallowtails which happen to be more red-sensitive than the meadowbrowns. In the Americas, the common occurrence of red flowers is striking, in contrast to Europe; we could mention cardinal-flowers *(Lobelia cardinalis),* fuchsias, red columbines, red currants, and the magnificent red honeysuckle of our Pacific Northwest, *Lonicera ciliosa*. But here, hummingbirds act as pollinators, and not insects. The color-vision of birds is very much like our own, the only qualification being that they seem to be somewhat extra-sensitive to red and orange hues. The reason for this may be that they possess a layer of orange-colored fat droplets in, or very close to the retina; for all practical purposes it is therefore just as if the hummingbirds are looking at the world through rosy spectacles!

Hummingbirds are confined to America, where they are to be found from Patagonia to Alaska. Often they live almost exclusively on nectar, sipping it on the wing. The reason why hummingbirds are such fantastically effective pollinators is that they have to keep feeding all the time; they are very small animals, weighing not more than a dime in some

cases, and it is a well-known fact that the smaller an animal is, the higher its metabolism. Hummingbirds, therefore, are like rapidly burning candles. A serious problem is created for them during the night; being visual animals, they cannot continue to feed, and if their metabolism should go on unabated, they would never see the light of another day. The solution which they have found to cope with this problem is that every evening they go into a state of hibernation. Their temperature drops, and around midnight the rate of metabolism is only about 1/15th of what it is during the daytime. The animals now are in such a state of torpor that one can pick them off their perches like ripe fruit! In the early morning hours, the metabolism spontaneously begins to rise again, and at dawn the hummingbirds are ready for another day's work. Bats know the same trick in reverse; it can be said that they hibernate during the daytime. Shrews, which have a rate of metabolism almost as high as that of the hummingbirds, do not know the trick, and for this they have to pay the penalty of remaining active most of the night.

We must now return to Sprengel's honeyguides. The classical demonstration that they really act as signposts was given by that marvelous experimentalist, Knoll. He found that the European hummingbird hawkmoth, Macroglossa (a species which flies during the daytime and has some partiality toward toadflax flowers) can be kept in captivity for long periods when fed honey or sugarwater from paper flower-models, or from toadflax flowers provided with an extra load of "nectar." Real toadflax flowers mounted between glass plates continue to attract Macroglossa; if the insects have been fed previously so that their long tongues are sticky, they will leave many sugary tracks on the glass. A permanent record of these marks can be made by spraying the plates with red lead and heating them. It then turns out that the insects are always aiming for the honeyguide! The results can easily be confirmed by experiments with models. Manning, in England, has shown that Knoll's conclusion can be generalized and that bumblebees too will follow honeyguides.

Since for reasons of equilibrium this short note should not be confined to the confirmation of Sprengel's superb devinations, we will wind up by discussing some very interesting cases in which smell rather than visual attraction plays a part. The South-African starfish flowers, Stapelias (members of the milkweed family) are, in general, characterized by a smell and color strongly reminiscent of rotting meat. They will therefore attract carrion-flies which will take care of pollination. The animals are fooled to such an extent that they will deposit their eggs (or maggots, as the case may be) in the flowers. Finding no food, the larvae must perish. It is therefore safe to say that Stapelia behaves as a parasite toward the flies. Paradoxically, if there should ever be sufficiently large numbers of Stapelia in a given area, they might very well dig their

(Continued on Page 30)

Below:

Bat-pollination in flowers of the sausage-tree, Kigelia. A bat is just sticking its head into the flower in the lower right hand corner.

FIG. 3 DRAWINGS BY MISS HILDA KERN

Selected Broad-Leaved Evergreens For Western Washington Gardens

CASH M. BEARDSLEY*

THE term "broadleaved" evergreen could be confusing if held to the true sense of the word, but it is quite apropos when considered in the light of distinguishing this group of evergreens from the coniferous evergreens. The Pernettyas can then quite logically be grouped with the Fatsias to show what a wide range of plants the broadleaves include. In attempting to select the best twelve, we have tried to consider all of the variables as to size, color, texture, and especially as to orientation.

Quite naturally, Rhododendrons and Azaleas stand out as the aristocrats on any such selective list. However, it seems that too much emphasis can be placed on the size and color of the flower instead of on the character of the plant itself, inasmuch as it is the habit of growth and leaf texture that predominates for the remaining 50 weeks of the year. For general landscape purposes, therefore, the flower can be left pretty much to personal preferences providing that ample discretion is used in avoiding unharmonious color combinations at any given season of bloom. The orientation as regards full sun or partial shade is also an important consideration in selecting varieties. Some of the better rhododendron hybrids for full sun would include, in various colors: The Hon. Jean Marie de Montague (red), Betty Wormald (pink), Unique (yellow) and Loder's White.

There has been an increasing interest in the hybridizing of new evergreen Azaleas. The Glenn Dale Hybrids and more recently the Gable Hybrids have added new interesting varieties that deserve to be better known in local gardens. These hybrids can furnish a complete palette of colors over a long and prolific season of bloom. They are hardy to sub-zero temperatures and make strong robust growers. Some of the typical selections would include James or Caroline Gable (red); Rosebud or Louise Gable (pink); Purple Splendor, a dark orchid; Geisha or Helen Close (an early and late White); and Glamour, a rose red which blooms at the same time and combines well with R. Betty Wormald. Anchorite, an early bright single pink, should also be mentioned as a very distinctive harbinger of spring, in a medium-sized shrub spreading to 4 feet.

Another garden aristocrat is the littleleaf Japanese holly *(Ilex crenata* var. *microphylla)*. It is entirely a foliage plant, the creamy white flowers and minute black berries being practically inconspicuous, but the deep green of the elongated boxwood-like leaf makes it a distinctive foliage plant of interesting growth habit. Its ultimate height is considered to be 8 to 10 feet, but it is very slow growing and can be easily contained to any reasonable height by judicious pruning.

For foliage contrast, the littleleaved holly combines well with *Viburnum Davidii,* another aristocratic broadleaf of smaller stature. It makes a broad flat mound of leathery, deeply-veined foliage which in contrast to the Ilex has more of a russet undertone. It masses effectively as a solid panel or makes a distinctive specimen plant in the patio.

Very few plants do as well in deep shade as the fragrant Sarcococca *(Sarcococca ruscifolia)*. It has little resemblance to the more common Himalayan Sarcococca *(S. Hookeriana)* in that it is rather loose growing, to three feet in height, with glossy dark green leaves about the size of the English holly leaf. If a light green is desired the willowleaf Sarcococca *(S. saligna)* also does well in deep shade, is of about the same stature as the deep green *S. ruscifolia* and makes a pleasing color contrast when combined with the latter, but is definitely less hardy.

In partial shade, the mountain Pieris *(Pieris floribunda)* makes an outstanding foliage

*Landscape Architect, Department of Parks, Seattle

plant. The brilliant red of the new growth resembles that of *Photinia serrulata* but has the additional advantage of a good flower in upright panicles, and the ultimate height of about eight feet makes it in much better scale for most garden requirements.

It is noted that in contemporary garden design the use of plant material is being concentrated in large masses of like plants, rather than in combination of many varieties of plants. These masses may take the shape of panels in a modular pattern or they may be used as a hedge to produce a strong element in the design. Again it is the foliage color and texture that weighs in making the selection.

For a formal clipped effect, the boxwoods are still second to none, especially the bigleaf Box *(Buxus sempervirens* var. *arborescens)* which is a relatively fast grower and can be counted on to create a strong element of lush green within a very few years. Where taller formal hedges amounting to a screen are required, the Dutch holly *(Ilex Aquifolium* 'Dutch') or Portugese laurel *(Prunus lusitanica)* would be at the head of the list.

Informal or unclipped hedge plants offer more of a selection and the choice of material depends on the shape and height desired. They are generally a cheaper quality material and therefore can be used more generously as fillers, background plants, or bank covers. Among these would be Oregon Grape *(Mahonia Aquifolium),* Zabel Laurel *(Prunus Laurocerasus* var. *Zabeliana),* Escallonias in variety, and for a taller screen, glossy privet *(Ligustrum lucidum).*

Broad-Leaved Evergreens in Eastern Washington

W. R. Nelson, Jr.*

BROAD-LEAVED evergreens to most eastern Washington gardeners automatically brings to mind rhododendrons, camellias, and laurels. Little thought is given to any of the smaller leaved evergreens that can be grown in this area, probably because they are fewer in number and smaller in size than those availabl to the coastal gardener. Nevertheless, gardeners east of the Cascade Mountains can boast of several shrubs in this group that have considerable ornamental value in garden plantings.

The desire for the showier types of broadleaved evergreens can be seen in the increased planting of rhododendrons. With careful hardiness selection, rhododendrons can be adapted to gardens in this area. Because acid soil is preferred by this group, the soil must be adequately prepared in advance of planting. It is important to provide them with abundant peat moss, leaf mold or other suitable organic material incorporated into the soil. They also benefit from a year-round mulch to retain soil moisture in summer and to lessen the damaging effects of the thawing and freezing conditions of winter. Adequate water must be applied throughout the year and protection from drying winds and direct sun are major maintenance requirements. Most local nursery catalogs offer various rhododendron hybrids grafted on the root stock of *Rhododendron ponticum.* This stock has been chosen on the basis of its hardiness and alkaline tolerance. It should be understood that the intense winter sun, severe winter temperature fluctuations, drying winds and the alkaline soil are environmental conditions completely opposite from those most desirable for the cultivation of rhododendrons. With these limiting factors, it is easy to understand why the quality of eastern Washington grown rhododendrons does not measure up to those grown in the more favorable conditions of the coastal area.

Another group of plants that prefers an acid soil but is grown east of the Cascades is the heathers (Erica species). The spring

*Director of the Finch Arboretum of the City of Spokane, Washington.

heath *(Erica carnea)* and several varieties of this species have been used with considerable success. In addition, varieties of the Mediterranean Heath *(Erica mediterranea)* are offered by many nurseries.

The following list of broad-leaved evergreens presents those plants that thrive in the environmental conditions existing in eastern Washington. They can be used in ornamental plantings without any special cultural practices other than normal care given to any of our plantings. This is an important difference between those groups noted above and these to follow.

Warty Barberry *(Berberis verruculosa)* is compact in its habit of growth and attains a height of four feet. The leathery green leaves make this an attractive year-round plant when used in foundation plantings and in shrub borders.

Several species in the Cotoneaster group are evergreen and are recommended for use. In the sub-shrub classification is the Bearberry Cotoneaster *(Cotoneaster Dammeri)* which has evergreen leaves one inch long. This shrub is prostrate and trailing in habit, providing an excellent ground cover. It also makes an excellent planting adjacent to rock outcroppings and in rockeries. An even smaller evergreen leaf (one-half inch long) is found in Rockspray Cotoneaster *(Cotoneaster microphylla)* which grows more or less flat on the ground but tends to mound up to two feet in height and spreads to several feet in diameter. Because of this habit of growth, its use in the garden is similar to the Bearberry Cotoneaster.

Rose Daphne *(Daphne cneorum)* is one of our exceptionally fine low growing shrubs. The fragrant pink flowers are borne in dense heads at the ends of the branches, providing two season interest with blooms in April and again in September. The shrub grows to eight inches in height with the evergreen foliage making a dense mat. Grouping several plants into a mass planting is an effective means of using this plant.

Another plant worthy of consideration can be found in the Bigleaf Wintercreeper *(Euonymus Fortunei* var. *vegetus)*. This plant has withstood even the severest winter temperature fluctuations without damage. The thick evergreen leaves and attractive fall fruit make this a most useful shrub in the garden. Its typical form is climbing or mounding on the ground. It is easily trained into an upright habit when provided with some type of support such as a building foundation or a wall. When allowed to spread on the ground, the only height it will attain is through the build-up of its branches. It can be used on slopes as a ground cover if it is pruned to force lateral branching or spreading; with support, as mentioned above, it makes an excellent hedge.

Outstanding in flower, fruit and foliage is the Oregon Hollygrape *(Mahonia Aquifolium)*. The bright yellow flowers, the blue grape-like fruits and the lustrous dark green, leathery leaves make this an effective plant for use in a variety of situations in the yard. In some areas of eastern Washington, the Oregon Hollygrape has suffered winter burn from the intense winter sun and drying winds. In such areas it is advisable to plant it in protected positions or in a north exposure.

One of the lesser known evergreen shrubs suitable for the eastern area is the Inkberry *(Ilex glabra)* which is one of the many species of holly. This tall growing shrub has a willowy habit of growth which lends itself well to use in the shrub border. The leaves of this plant are a shining green and the black fruit of this holly remains on the shrub until late spring.

In a protected area or slightly shaded situation, the Leatherleaf Viburnum *(Viburnum rhytidophyllum)* is an outstanding evergreen growing to eight feet in height. The foliage of this plant is the largest of any of the hardier broad-leaved evergreens, measuring as much as six inches long. The leaves are a deep green which have an interesting texture due to their wrinkled surface. Although the character of this plant is somewhat coarse, it is an interesting plant for use in our gardens.

Broad-Leaved Evergreens in the Arboretum

J. A. Witt

THE broad-leaved evergreen forms, or should form, the background of garden plantings in the Puget Sound area. The wealth of material available is staggering, especially when one considers the number of rhododendrons and camellias which can be used. In making selections of the best for this article, I feel a bit like the child confronted with a tray of French pastry and told to take only one. How to choose from such a wonderful array is an almost impossible task, made even harder since what might be "the best" for one situation could easily be "the poorest" for another. Yet certain plants stand out as being superior, either for form, leaf or flowers, and since I have a predilection for the natives of our area, I have assembled a list of broad-leaved evergreens that stand above the rest.

Two broad-leaved evergreen trees are outstanding for our area, one a native, one from the southeastern states.

Arbutus Menziesii, the madrona, has been called the noblest of the heath family, and certainly justifies that name. Its bark, red-brown and peeling; its branching habit, its glossy green leaves, its general look of sturdiness all make it a plant of distinction, one remarked on by most visitors to this area.

To be truthful, the madrona is not an easy tree to live with. Firstly, it is well known for its messy habits, shedding its leaves, bark, fruit and flowers in great abundance and making the late summer months a drudgery of constant raking. Secondly, it is a difficult tree to plant under, since its dense shade and falling leaves make life miserable for lesser plants beneath. It is also among the most difficult of trees to transplant and rarely can a specimen larger than 18 inches be moved. Even so, there is a beautiful grove of madronas near Sand Point that were all transplanted, some, according to the owner, when they were as large as eight to ten feet tall. However, it is probably easier to buy property with native madronas than to depend on establishing them where they are not.

The other tree is not as controversial, but is perhaps less adaptable to our climate. *Magnolia grandiflora,* the evergreen magnolia, Bull bay, or southern magnolia will make a spreading tree of considerable size here, although the largest tree in the Arboretum is now only about 13½ feet high after some 19 years. There are taller specimens than this elsewhere in Seattle. The tree has shining green leaves, often covered with a brown felt beneath, very stiff so they rattle in the wind. The flowers, from July to October, are creamy white, huge, often nearly a foot across when open and with as fragrant a perfume as any blossom we have. The evergreen magnolia is subject to extreme cold, and may be frozen back as some were in November of 1955. We should consider it more of a wall plant than a specimen tree, for then it receives extra shelter from cold, and added heat in the summer months, so necessary for good flowering. Of simple culture, merely needing a good well-drained soil and occasional mulching, it is among our best trees.

The hollies offer us some of the finest of broad-leaved evergreens, and certainly no list would be complete without one of the English holly forms. The choice here is not an easy one, but the Camellia-leaved form, *Ilex Aquifolium* 'Camelliaefolia' is outstanding. Our trees in the Holly collection now stand about 12 or 13 feet tall, with a smooth narrowly pyramidal shape. The leaves are a dark green, large and almost spineless—only an occasional leaf will develop a few teeth along its margin. The new wood is dark purple, and this color extends up the petioles into the blade, enhancing the dark luster of the leaves. The fruit is bright scarlet red and about half again as large as the usual holly berry, but not borne in such profusion.

Except when it carries a heavy crop of fruit, 'Camelliaefolia' is a somber plant. In

sharp contrast, the Japanese Holly, *Ilex crenata* var. *convexa,* is a shrub of irregular spreading habit, rarely more than five or six feet tall and covered with small bright green leaves. The fruit is small and black, almost inconspicuous. This holly makes a fine low hedge, either pruned or informal, and can be used in many other ways in the garden where a low loose evergreen is needed.

The native evergreen huckleberry, *Vaccinium ovatum,* may be used in the same way as the Japanese hollies since the leaf and plant size are much the same, yet the two plants are very different. The evergreen huckleberry is without a peer among shrubs for planting on the north side of buildings, yet it will stand a reasonable amount of sun and seems to be happy in the south-facing slope of Woodland Garden where it is protected by the maples and firs overhead. It may be as tall as twelve feet, but more normally it stays below five or six feet and might have a spread of half that amount. In the late spring the new growth of bright coppery-bronze contrasts beautifully with the darker green of the older leaves. The flowers are small but charming pale pink bells borne in profuse clusters under the branches, and soon change into black fruit, which is often covered with a blue bloom. The berry is among the most delicious of all our native fruits and is especially good in pie or jams. If one can give this huckleberry a soil with plenty of organic matter, ideally old rotten wood, and a moist but not wet site it will be among the most rewarding of our native shrubs.

Three shrubby relatives of the vaccinium must surely be included in the "best" list; all members of the *Ericaceae* or Rhododendron family.

The Arctostaphylos or manzanitas from California and Southern Oregon are sometimes border-line plants in this area and we find some of the showiest are killed in a hard winter. We have three species growing in the Arboretum that seem reasonably weatherproof and are certainly as desirable as any. The tallest, *Arctostaphylos Manzanita,* is found growing at high elevations in Northern California. Here it develops into a shrub of some 12 to 15 or more feet with a delightfully knarled and curled mahogany-red stem, roundish green leaves and pink shoots. The flowers, appearing in early March, are white to pale pink in long loose clusters hanging from the ends of the shoots. Nearly related and equally handsome is the Stanford manzanita, *Arctostaphylos Stanfordiana,* a species also from northern California. Our plants have proved to be completely hard and are lower growing than the common manzanita, four or five feet tall in ten or twelve years. The foliage is long and narrow, bright yellow green, which on a somewhat spreading plant gives a very lacy textural effect. The flowers which come about a month later than Manzanita are small pink waxen urns, dangling in clusters from the tips of the branches, and are as attractive in bud as in bloom. These two manzanitas complement each other so well that they should be thought of as a team and not as individuals. Our own native manzanita, *Arctostaphylos columbiana,* from the Kitsap and Olympic Peninsulas, should certainly be considered for its gray-green foliage, striking red-brown bark and tight clusters of shining brown fruit. All the manzanitas are difficult to move when large, and need a sunny, well-drained site, yet they are rewarding enough to warrant a little extra trouble in establishing them, as they are on the bank east of Rhododendron Glen.

Kalmia latifolia is so well known that little need be said about it, save that it may grow into a somewhat larger plant than most gardeners realize. The large group of mountain laurel in Rhododendron Glen was probably planted in 1940; the largest plant is now about seven feet tall and somewhat broader with a stem four or five inches through at the ground. These are still growing and may be expected to become very much larger in another twenty years. The location of this group is perhaps perfect for developing the glossy green foliage and the beautiful pink unopened flowers which so resemble the frosting buds of cake decoration. It has a deep sandy loam with a large amount of rich or-

ganic material added each year and a southwesterly exposure, though protected by a canopy of cascara and maple from the hot afternoon sun. It may be that only in the Appalachian and Cumberland Mountains will they be found any happier.

The last of the *Ericaceae* to be included are the Pieris, with *Pieris japonica* leading the group, justly so for its attractive foliage and striking flowers; often called *Andromeda japonica,* this is nearly as common in the gardens of the area as the rhododendrons and camellias. Three other species of Pieris should be as well known; *Pieris floribunda* for its erect spikes of white bells and pale green leaves, hardy and reliable; *P. formosa,* with leaves almost twice as large as *P. japonica* that develop a striking bronze and red color when unfolding in the spring, and *P. taiwanensis,* deserving a protected place for its large clusters of flowers and showy foliage. All these are growing in the Pieris bed below and to the north of Rhododendron Glen.

Our native Oregon grapes, *Mahonia Aquifolium, M. nervosa,* and *M. repens,* deserve to be included because of their interesting foliage, bright yellow flowers and rich blue fruit. They are all adaptable to our gardens, and differ mainly in habit. Were I to choose one it would be *M. Aquifolium* since it is the most versatile. Depending on the treatment given it, it will be a low shrub rarely exceeding four to five feet, or a great leggy vine-like specimen, well over ten or twelve feet tall. It may grow in full sun, where it is of low stature and often develops brilliant winter color in the foliage, or in deep shade where it keeps its bright green color during the cold months and becomes a tall specimen. The new foliage is a delicious soft green contrasting in color and texture to the indurate and dusky older leaves. It incidentally is easily grown from seeds, and the seedlings may offer some interesting variation from the parents and from each other. *Mahonia nervosa* is much lower growing, has a leaf of brighter green color and a firmer texture than its tall cousin. It usually grows in deeper shade and seems unhappy in the sun. On the other hand the prostrate *M. repens* is happiest in a warm sunny spot and is an ideal rockery shrub. It too develops the bright winter color of the tall Oregon grape.

Such is my list, but what about the Sarcococcas for winter fragrance, the laurels which grow so easily, the host of cotoneasters and pyracanthas for brilliant fall fruit? How can we leave out the gaultherias, ranging from the tall salal to the delicate *G. nummularioides,* the beautiful blue flowered ceanothus, and the stately evergreen oaks. Patently, we must exclude so many fine plants that a list of twice this length would be too short. However, if we were to use only the above broad-leaved evergreens, there would be no lack of interest in our gardens.

Spring Plantings

Due partly to illness in our planting crew in February, but also in considerable measure to the impending bridge and highway building through the Arboretum, which prevents any use of land west of Lake Washington Boulevard north of the proposed Japanese tea garden area, on Foster's Island or in the crab apple-mountain ash sections to the west, new plantings this year have been fewer than usual.

Some of the more interesting have been: a collection of six forms of *Potentilla fruticosa,* replacing the group of Pernettya in the border by the clubhouse; these were donated by Hollandia Gardens, of Lake City, Seattle.

Across Arboretum Drive, east of the magnolias, six Philadelphus were added to the collection, two being English hybrids not previously grown here. In the same area additions have been made to the spruces (three Asiatic species) and to the mountain ashes (Sorbus)—six species, one plant of each—the latter now a very representative collection of this attractive genus.

On the east side of the nursery a small area was cleared, cultivated and planted along the fence to form a screen composed of pines (five kinds) separated by groups of cypress species and *Thuja Orientalis* from Korea.

The Changing Scene

3. The Lagoon Area

ONE of the larger projects carried out in 1938-39 by the W. P. A., when the groundwork for the Arboretum was being laid according to the Olmsted Bros. plans, was the dredging of some half a million yards of silt and peat from the marshy area at the north end of the Arboretum, to form a lagoon with two connecting channels to Lake Washington. The intention behind this was no doubt to provide a series of water vistas from the north gate and the road around the lagoon, as well as an appropriate site for growing water lilies.

After the enforced neglect of the war years the banks of the lagoon, viewed from the southwest corner, appeared in September 1948 as in figure 4. A dense thicket of native willows and alders covered most of the east and south banks, while on the higher western side (composed chiefly of an old city garbage fill and its covering) brambles were running riot.

In the winter of 1948-49 the residents of Broadmoor, adjoining the Arboretum on the east and seeing this condition every time they went out by their northwest gate, generously raised about $1,500.00 to provide an extra man on our crew to help in the clearing operations, the services of a bulldozer to level and grade the banks after most of the woody vegetation had been removed, and finally about 1000 feet of 4-inch drain tiles to carry off excess water on the south and east slopes.

Thanks to this gift the needed work was soon accomplished. Following proper cultivation and preparation grass was sown over the larger part of the area and with regular mowing, fertilizing and spraying annually with 2-4-D to suppress weeds a very fair cover has been maintained. During the past year the final remaining portion at the west end of the old fill has been graded, cultivated and sown with grass seed, so that visitors will soon be able to walk on grass over the whole area.

It would not be difficult to build a short bridge over the channel on this west side, to connect it with the mountain ash and crab apple collections beyond, to which at present access is only possible through the gate from Lake Washington Boulevard at Miller Street, but in view of the proposed building of the second Lake Washington bridge across the north end of the Arboretum, to be followed within four years by the northward extension of Empire Way into this very area, it would be foolish to do so at the present time.

Since these banks were cleared a gradual and careful planting of young trees has taken place, at first only on the east slope but later extending around the south and toward the western end of the area. A collection of hornbeams *(Carpinus* species) has been assembled in front of the Broadmoor entrance (fig. 5), starting with six plants in April, 1950, but now comprising some twenty plants of eight different species. The largest have reached 12 feet in height after eight years' growth.

At the south end young trees of six kinds of lindens *(Tilia* species), mostly of Asiatic origin, were planted in 1957-58. If not disturbed they should in due course make excellent shade trees, continuing the planting of lindens *(Tilia cordata)* which now exists along the Boulevard to the west.

Between the hornbeams and the lindens is a vigorous young specimen 19 feet high of an Empress tree from western China, *Paulownia Fargesii,* raised here from Italian seeds and

(Continued on Page 25)

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Upper:

Area surrounding the Lagoon, September 1948.

Fig. 4 PHOTO BY E. F. (WHITIE) MARTEN

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Lower:

Lagoon and surrounding areas, March 1958.

FIG. 5 PHOTO BY E. F. (WHITIE) MARTEN

New or Unusual Plants in the Arboretum

J. A. Witt

6. *Illicium anisatum* Linnaeus

THERE is an area in the Arboretum on the west side of the Magnolia collection which has a western aspect and is protected by a shield of Oregon maples and tall conifers from both the hottest afternoon sun and the biting north winds. The site is sheltered enough and warm enough to warrant planting it with some of the more doubtfully hardy specimens. Such plants as *Mahonia lomariifolia,* tender *Osmanthus* species and hybrids, *Guevina Avellana, Itea ilicifolia* and three species of *Illicium* have been tried with varying degrees of success. The *Illicium's* continued survival has proved most surprising and one, the Japanese star anise, is worthy of note.

Illicium anisatum is native to southern Japan and islands off the South Korean coast, where it is a small tree 15 to 20 feet tall. It is reported quite rare in the wild state and was considered by many early botanists to have been imported into Japan from China by the Buddhist priests. In fact, due to confusion with another species, as will be explained later, most early references cite China as its native habitat. It is among the plants used in the religious practices of Japan where it is often planted around temples and shrines. This connection with religion is duly noted in the synonomous name, *Illicium religiosum,* given by Siebold in 1835, who remarked on its uses in the Buddhist worship as a plant for cut branches and as a source of incense. Most early authors when writing about *Illicium anisatum* mention one unusual use of the bark. It was powdered and placed in a hollow tube marked in equal, predetermined sections, and when ignited burned at such an even rate that time was measured by the

passing of the marks by the flame. In short, it was used as the "works" of a pyrotechnic clock.

Due probably to the lack of communication between the far east and Europe, our subject was long confused with another *Illicium* species now known to occur in southern China and southwestern Asia, not in Japan. This is the true, or Chinese, Star anise, *I. verum*. As early as 1588 the fruit of this species was imported by Europeans from China, and regularly through Russia afterwards. The seeds of this plant were, and still are, used as a flavoring, stimulant, and carminative, though the oil distilled from them, oil of Anise, is the form most commonly met now. It was not until 1881 that the true source of star anise was discovered by Europeans, despite the fact that the Japanese knew their plant to be poison and an unlikely source for a flavoring agent.

Despite this confusion of species, the Japanese *Illicium anisatum* was growing in England by 1807 and was probably introduced around 1790 from Holland. It has been grown in the southeastern United States for some time, very likely since the 1850's or before, but I have been unable to find an exact date for its introduction to this country.

The Arboretum's plant is the sole remaining specimen of five raised from seed received from Herbst Brothers of New York in 1950 and planted out in December 1954. The other four met their demise in the black November, 1955, freeze. Why this plant should survive and the other four be killed is one of minor puzzles which beset horticulturists. Perhaps the remaining plant contains the genetic capabilities necessary to withstand the cold, or perhaps it was due to some happy accident of site that allowed it to survive while its mates near by did not. Regardless, this specimen is now a handsome, compact shrub of about three feet high and as much across, with evergreen leaves two to four inches long, three-fourths to one and one-fourth inches wide, oval, dark shining green above and much paler beneath. The wood is yellow green when young, then changing to an ashy-brown as it gets older. Both the leaves and the bark have an agreeable odor when crushed. The flowers, which appeared for the first time in early April, 1958, remind one of the related magnolias and wintersweet *(Chimonanthus praecox)* in shape. They are about an inch across when open, composed of up to thirty narrow pale yellow-green petals around a brighter yellow center of anthers, and are carried on short thick stalks arising in the leaf axils. By late October the fruit has developed, and it is then evident why the plant is called Star anise. Each fruit is a shining green and brown star-shaped ring of one-seeded woody carpels, about an inch across. When dried the carpels split revealing a smooth, light brown egg-shaped seed. Both the fruit and the seed have the aromatic oils typical of the rest of the plant (fig. 6).

From a purely ornamental point of view, *Illicium anisatum i*s probably best considered as a foliage plant, since neither the flowers nor the fruit is conspicuous enough to make much of a display, at least in our climate. In Florida and South Carolina the shrub is said to be very beautiful in flower.

Growing in the same arboretum area, indeed surrounding the Japanese star anise, are plants of the two North American *Illicium* species; *I. floridanum,* from the coastal region of Florida to Louisiana, with reddish purple flowers and larger leaves; and *I. parviflorum* with yellow flowers and smaller leaves, native from Florida to Georgia. Both are reported as rare in their home range. We were fortunate enough to flower, albeit shyly, *I. floridanum* in June, 1955 and expect to see it blossom again, possibly this spring. Considering the southerly range these Illiciums have, their survival when planted here was very problematical and it is remarkable that they are still with us.

Propagation is by seeds, layers, or cuttings,

(Continued on Page 32)

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Illicium anisatum, first flowering 1958.
Insert: Fruit November 1958.

Photo by Whitie Marten
Fruit: William Eng

Fig. 6

Magnolia Kobus 'Wada's Memory'

B. O. Mulligan

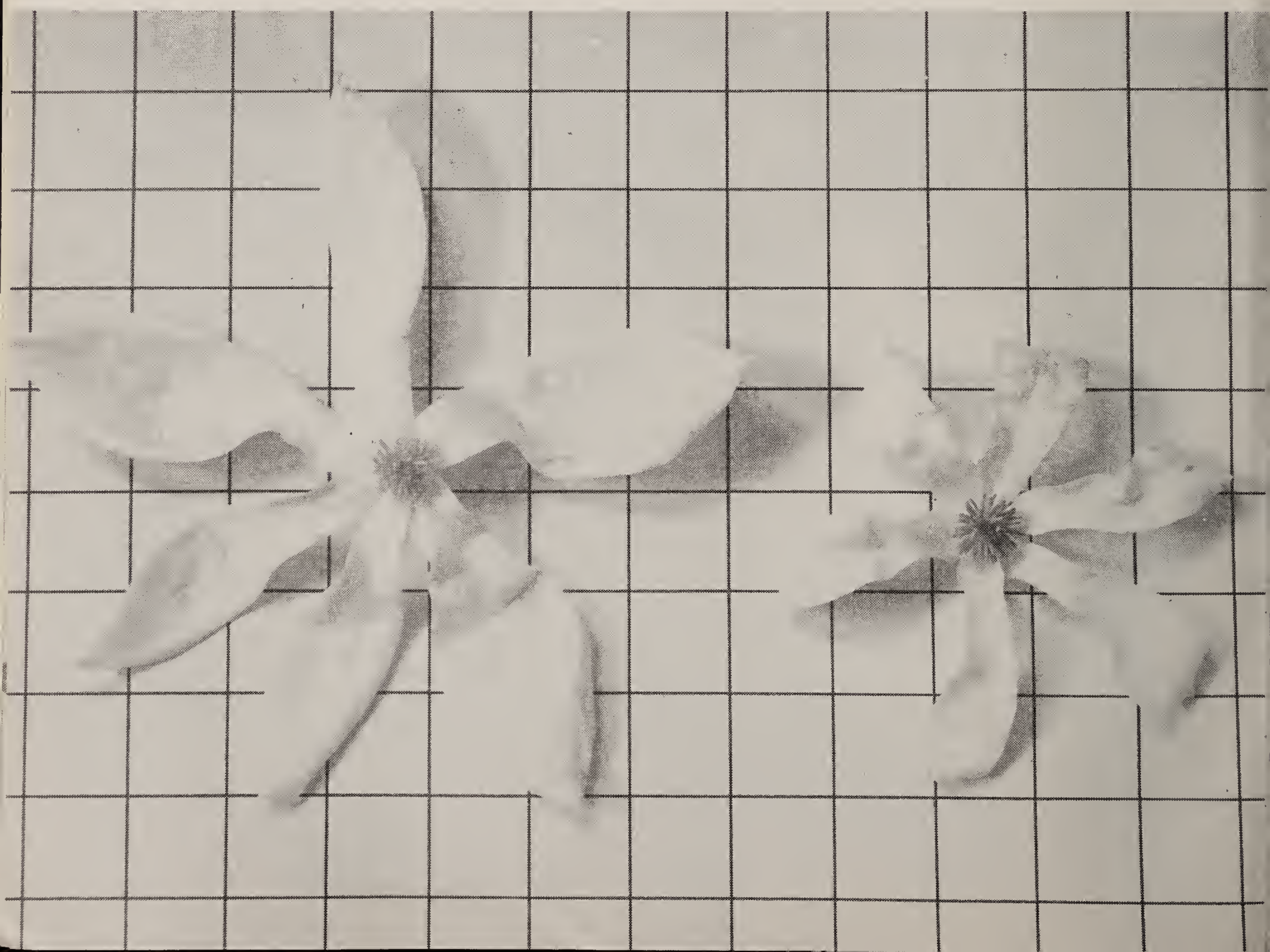
IN March, 1940, a large collection of maples, camellias, magnolias and a few other plants was purchased from K. Wada, Hakoneya Nursery, Numazushi, Japan. Amongst the magnolias were plants of *M. Kobus,* one of the two largest types native to that country where, according to C. S. Sargent,* it was very common in the northern island of Hokkaido, much less so on the main island of Honshu. It is, however, found throughout Japan and also on Quelpaert Island, south of Korea.

In 1947 one of these plants was placed on the south bank at the top of Rhododendron Glen, in a situation where it gets sun early in the day but comparatively little after 11 a.m. in the summer, since it is shaded on the southwest side by a pair of native western hemlock trees. The soil is sandy but well mulched annually with leaves; rhododendrons, camellias and hydrangeas thrive in it.

The first flowers were seen in the spring of 1949; by 1952 it was becoming very noticeable among the surrounding evergreens at that season, being close to Arboretum Drive. During the last few years the tree has annually been covered, especially in the upper half, with multitudes of the drooping white flowers, individually much larger than on any other tree of *M. Kobus* in the Arboretum. Full bloom is usually between April 8 and 20, varying slightly with each season; in 1958 it was three weeks earlier than usual.

The rate of growth has also been notable. By 1954, seven years after planting (when it may have been 7-8 feet tall), it had reached 22 feet; by October 1958 it was 32 feet, but as it now flowers almost to the top it may be nearing its maximum here. In Japan this

*In "Forest Flora of Japan" (Boston, 1894)



species can attain 70 or 80 feet in the forests of Hokkaido.

Since this appears to be an unusually fine form of *M. Kobus* and we have begun to propagate and distribute it, it seems advisable to give it a clonal name which can only be attached to plants produced by vegetative means from this parent tree. The selected name, "Wada's Memory," was chosen by Mr. Wada himself, who informed us in a letter dated April 22, 1957, that *M. Kobus* is a very variable species and that he has seen many different forms in the wild state.

In "Trees and Shrubs," Vol. II, pp. 57-58 (Boston, 1908), Prof. Sargent published *M. Kobus* var. *borealis,* describing it as a large tree 60 to 90 feet or more tall in central Hokkaido, differing from *M. Kobus* chiefly in the larger size of the flowers, leaves and fruits, as well as in the arborescent habit found even in young trees, but flowering more sparingly in cultivation than the latter. Although our tree does have larger flowers and leaves than normal for this species, yet we have no knowledge of its real origin and as material of it has not been compared with authentic specimens of var. *borealis* from Japan, it seems wiser at this stage to consider it only as a form of *M. Kobus,* especially as many of our other young plants appear much more tree-like in form and have as yet produced few or no flowers, although some will do so this year.

In any event, this magnolia promises to be a most valuable hardy spring flowering tree for all the Northwest and many other regions too, capable of flowering freely at an early age for its species, easily propagated by summer cuttings or spring grafting, and having no problems of cultivation; space to develop and an annual mulching with some form of humus seem to be its chief requirements. We are happy to honor Mr. Wada in this way, who in 1940-41 supplied the Arboretum with many excellent young trees and shrubs, notably the collection of forms of *Acer palmatum* and other species of maples.

Dried specimens of the flowers have been deposited in the herbaria of the Bailey Hortorium of Cornell University and the Arnold Arboretum of Harvard University.

A detailed description follows:

Habit: Upright, bushy, compact.

Bark of 1-2 year-old wood olive green becoming brownish, especially towards the base, on the exposed side; lighter olive green beneath; of 3 year branches chocolate brown on the upper side marked with frequently elongated, narrow gray lenticels; wood strongly anise scented. Leaf bud scales finely appressed pubescent.

Young leaves at flowering glabrous excepting a few silky hairs on the upper side of the petiole.

Flowers drooping, solitary, terminal on slender shoots (3-4 mm. diam. at the median internodes); pedicel 7-10 mm. long, glabrous excepting a few scattered hairs around apex and with a conspicuous ring of silky hairs at its base; bud scales gray, the outer pair densely covered with long silky hairs, the inner progressively less so, 3-3.5 cm. long. Flowers very fragrant of anise.

Perianth 15-18 cm. diam. when expanded, but all or most of segments soon reflexing; sepals 3, lanceolate, thin in texture, recurving, 4-4.5 cm. long, 7-8 mm. wide at the center, sharply acute, with a raised midrib on the outer surface, glabrous; three outer petals oblong-obovate (8-) 10-11 (-12) cm. long, 4-4.5 cm. across at widest part, white, but with faint pale pink tinge outside at base; inner segments similar but generally slightly narrower (3.5-4 cm.) (fig. ....).

Flowers protogynous; stamens glabrous, about 1 cm. long (filament 2 mm.), creamy white stained pink on filaments; gynophore and ovary glabrous, 2 cm. long, the latter green, about 4 mm. diam. at its center; styles about 3 mm. long, white.

Leaves tinged mahogany red on both sides when young, deeper on upper side, color soon disappearing; when mature, obovate-oblong to ovate-oblong, the lamina (of leaves from young shoots) 13-15 cm. long, 6-7 cm. wide, on spur leaves up to 12 x 7 cm., of thin but tough texture, apex abruptly acute, base cuneate, glaucescent beneath and thinly appressed pubescent, especially near the midrib, becoming glabrous or nearly so, veins 9-13 pairs, prominently raised beneath; petiole 1.5-2.5 cm. long, thinly appressed pubescent only along the grooved or ridged upper side.

Fruit. Has been produced somewhat irregularly; superficially it does not differ from other plants of this species, but no detailed description has been made.

Chromosomes diploid ($2n = 38$), fide Dr. A. R. Kruckeberg, Department of Botany, University of Washington.

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Flower of *Magnolia Kobus* on right; of the form 'Wada's Memory' on left.
Background of 1-inch squares.

FIG. 7 PHOTO BY J. A. WITT

Dexter Estate

Sandwich, Massachusetts

THE name Dexter has become synonymous with hybrid rhododendrons, for it was the late Charles O. Dexter who dedicated so much of his life to hybridizing rhododendrons. His estate at Sandwich, Massachusetts, located on Cape Cod, became the birthplace of many of the most beautiful rhododendron collections now in existence. Upon his death, in 1947, many of his seedlings and nursery-size plants were sold or otherwise distributed. However, the mother plants, some of which have grown to surprising heights, to this present day remain on the Dexter estate. Mr. Dexter passed away, unfortunately, prior to the advent of cutting propagation. Since so many of the saleable-sized plants were distributed by the subsequent owners of his estate, many thought that the Dexter story had ended. However, Robert and Stanley Berns, owners of Marvel Industries, Inc., of Boston, Massachusetts, were interested in diversifying the products of their company which include commercial vacuum cleaners, floor scrubbing and polishing machines and accordion rubber hoses. In the spring of 1957 they purchased the Dexter estate. Dexter rhododendrons have now been added to the products of this young aggressive company. During the height of the blooming season, the Dexter estate is a picture paradise that defies description. Many thousands of colorful Dexters with petals and throats from pure white to deep red, from apricot to ivory, from orchid to mahogany and deep purple startle the onlooker. A considerable proportion of these plants have the famed Dexter fragrance. Although Mr. Dexter did not keep notes or records on his propagation work, hundreds of metal identification tags placed on parent stock by Mr. Dexter were found.

Stanley and Robert Berns have called in experts for consultations and first-hand observance. Choice plants were selected for propagation and approximately 20,000 rooted cuttings will be available this spring for lining out and for sale. At blooming time this year a crew of men took pictures and inventoried hundreds of the best species (fig. 8).

Besides rhododendrons, there are hundreds of other exotic species. Azaleas, a fabulous collection of mountain laurel, and other kinds too numerous to mention. Mr. Dexter was a textile tycoon who took up horticulture as a hobby. His great energy made his hobby more of an avocation and he collected fine specimens of many plants from all over the world. It is said that he put $2,000,000 into Dexter in an era, right after World War I, when a dollar brought much more than it does now. Today, the Dexter estate is a landmark for rhododendron fanciers, landscape enthusiasts, and horticulturists. Besides the horticultural collection, Dexter is a bird sanctuary and small game preserve. It is situated in Sandwich, Massachusetts, and has a one-third mile frontage on Shawme Lake. It is the hope of the Berns brothers to make the Dexter estate one of the nation's leading growers and propagators of rhododendrons.

Anyone interested in the propagation and growth of Dexter rhododendrons or the purchase of the same, please contact Mr. Stanley Berns. Arrangements can be made to visit Dexter by writing Mr. Berns at the Dexter Estate, Sandwich, Massachusetts.

Everyone Is Invited and Urged to Join in the Big Clean-Up

WORK & FUN DAY

at the Arboretum

APRIL 8—ARBOR DAY

9:30 a.m. to 2:30 p.m.

Tree Planting Ceremony • Prizes

←

Spring scene in the Dexter Garden.

FIG. 8

"Let's Brag About Our Units"

Unit 25, the "Over-all Arboretum Unit," a group from the West Seattle area, was organized by Mrs. Carl M. Ballard and Mrs. Kenneth L. Mead March 1, 1945. This very active group meets the third Wednesday of each month and has a very diverse study program geared to the desires of its members. We have been very fortunate in our fund-raising projects and being members of the West Seattle Garden club have a greater incentive to make money as it goes into our "Woodland Garden." This past year we diverted some of our funds to purchase a mist unit for the greenhouse. We will indirectly benefit from this in the propagation of plants.

Our most profitable project is our annual fall bazaar held at the October meeting of the garden club, at which we clear around one hundred dollars. We participate in the annual spring plant sale and are given credit for the amount of money realized on plants donated by us. We have 24 lap trays that we rent to other groups for 50 cents, sell recipes for 10 cents, bring surplus plants for sale at each meeting and have won $25.00 and $15.00 on "Cook Book Quiz."

We have 20 members in our group, a large percentage being charter members. We have a very good reference library and try to add two books each year. We also have many Extension Bulletins.

We have a very good turnout on "Work and Fun Day," have planted bulbs in Woodland Garden and are now doing the pleasant job of seed packaging.

(Mrs. Mead, 1/22/59)

I should like to use this opportunity to commend the above unit for the wonderful help that they have given me personally and the International Seed Exchange generally in their packaging of our seeds. To this important phase of the Arboretum's work, Unit 25 has devoted many long hours to an arduous and exacting task and has relieved me of a time-consuming routine chore. I extend my most sincere thanks to them for a job well done.

J. A. WITT

The Arboretum Bulletin

VOL. XXII, NO. 1 SEATTLE, WASH. SPRING, 1959

ARBORETUM FOUNDATION
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9 a. m. to 4:30 p. m.
Monday through Friday
Phone EAst 5-4510

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Special Notice

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and THE BULLETIN will be discontinued.

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I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

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All memberships are non-assessable.

Notes and Comment

The University of Washington College of Forestry has recently received a gift in excess of $25,000 for special projects at the University Arboretum. $2,500 of this has been allocated to the Director for two special projects —$1,500 is to be used to complete the mapping of the plantings which was begun several years ago; a thousand dollars will be used for cataloging the plantings. The remainder of the funds, approximately $22,500, is to be used in the construction of a Japanese Garden. In the administration of the Japanese Garden project the University will work closely with the Arboretum Foundation in both the planning and carrying out of the work. It is the hope of the donors that they may be able to contribute additional funds for the Japanese Garden, both in 1959 and in 1960.

A dream of long standing with the staff, a catalogue of the trees and shrubs growing in the Arboretum, is now becoming a reality. The preliminary work necessary for the publication of the catalogue was started early this year, and we have an outstanding forestry student, Miss Janet O'Donnell, checking all the plants actually growing in the Arboretum as well as our card file, in order that our list may be as accurate and complete as possible. This phase of the cataloguing may take several years so that no publication date has been set.

A portion of the Arboretum Development Fund is being utilized for this purpose.

The Arboretum office will be open on Sunday from 10:00 a.m. to 5:00 p.m. starting March 22 through early June. Mr. Witt, the assistant director, will be in attendance.

Calendar of Important Events

APRIL 8—Wednesday (Arbor Day)—**WORK-AND-FUN-DAY** at the Arboretum. Everyone is invited to join in this 4th annual clean-up stint. We hope to make it the best ever. Starting time 9:30 a.m.

APRIL 12—Sunday—**CHERRY FESTIVAL**—Arboretum 2:00 p.m. to 5:00 p.m. Come see the Arboretum in Spring beauty, the Japanese dancers, etc.

MAY 6-7—Wednesday and Thursday—**1st 1959 TOWN AND COUNTRY GARDEN TOURS**—three gardens in Broadmoor; three gardens on Mercer Island.

MAY 14—Thursday—**TOWN AND COUNTRY GARDEN TOUR** to four gardens in Tacoma. Luncheon at the Tacoma Country Club (by reservation). All gardens open from 11:00 a.m. to 4:00 p.m. Please call the Arboretum Foundation office for further details on any of these important dates! EAst 5-4510.

Recent Book Acquisitions

Several notable items, both old and new publications, have been added to our library during the winter months.

The most outstanding is *Rhododendrons of Sikkim-Himalaya,* by J. D. Hooker, published in London, 1849, containing 33 hand-colored plates of species then described for the first time. Visitors in our office will remember the framed illustrations from this unique work which adorn the walls. Now through a generous gift from Unit No. 8 we possess the complete book, of folio size.

Another very recent and beautiful publication is *The Rhododendron,* by Mrs. B. L. Urquhart, published at the Urquhart Press in England, 1958. This, the first of a projected series, contains 18 plates of high quality reproduced from paintings of various species by Carlos von Riefel. We are indebted to the Friendly Neighbors Garden Club for this handsome acquisition.

A third is J. R. Sealy's *Revision of the Genus Camellia,* (Royal Horticultural Society, London, 1958), a complete botanical study of the genus, illustrated by a color plate of *C. saluenensis* by Stella Ross-Craig and 102 drawings by the author. This copy appropriately was a gift from Camellia Unit No. 23.

B.O.M.

The Changing Scene

(Continued from Page 17)

flowered in ten years. Other interest will be provided by several kinds of willows, for their conspicuous early spring flowers, silver foliage in summer, or golden stems during the dull months of winter.

Altogether much has been done to improve this corner of the Arboretum during the past decade; it will be a serious loss to its amenities, to the citizens of Seattle and to our visitors if the lagoon and channels are filled in and destroyed by the construction of the impending Lake bridge.

B.O.M.

Ponderosa Pine

(Continued from Page 5)

of several species of bark beetles which kill trees by constructing galleries in the cambium tissue, just beneath the bark. Such damage is normally confined to trees of low vigor —large specimens which are overmature or which suffer through competition with other trees in severely crowded stands.

Educational Program of the Brooklyn Botanic Garden

(Continued from Page 2)

fun. They come because they want to, not because they have to. With some, it is much more than recreation. This is especially true of those who start while in the fourth grade and continue right along until they graduate from high school. The interests of these longer-term students have been sparked and channeled toward science. Many of these go on to agricultural colleges or to liberal arts colleges where they major in biology.

How is such a diverse set of programs supported? The Brooklyn Botanic Garden is one of a dozen cultural institutions affiliated with the City of New York. Others include the Metropolitan Museum of Art, American Museum of Natural History, Bronx Zoo and the New York Botanical Garden. The land and buildings are owned by the City. All the plant collections, the library, scientific and other equipment belongs to the Trustees. Last year 45% of the total support came from the City of New York, 55% from special gifts, endowment, and dues of members. Nearly all the expense of the educational program comes from the endowment, membership fees, and contributions. Thus, the costs of courses for adults and children are kept to a minimum. Children, for example, pay 40¢ for a greenhouse series, which partially reimburses the Botanic Garden for plants and pots they take home. Adult course tuitions average about ten dollars. Incidentally, the penny seed packets of 1914 are now two-penny packets!

ARBORETUM NOTEBOOK

This section is particularly designed for notes, information and queries concerning beautiful or unusual plants from growers of all types or experience. We solicit your remarks and ideas, but space limitations may sometimes restrict us to publishing those of the widest interest.

APRIL

Arbutus Menziesii—Madrona

"A tree under which idle men delight to lie."
PLATO.

It has been said that no American tree of considerable size equals the madrona in beauty the year around.

Its distribution is limited to a comparatively narrow strip overlooking the Pacific Northwest coast. Archibald Menzies first saw the madrona at Discovery Bay near Port Townsend, Washington, and in his journal (1792) he called it the Oriental Strawberry Tree.

The rare, deep and rich color of its bark is decidedly arresting, a lively dark crimson in winter with a velvety smoothness. Chemicals in the sap, peculiar to the madrona, are in each layer of bark developing different colors. In spring and summer these layers form long ribbons and patches of pale, pea green, gray and soft yellow along the trunk. Bret Harte said the tree suggested a woodland troubadour in Lincoln green and scarlet hose.

It is a member of the Ericaceae family to which the heather belongs. The blossoms, in April, are in clusters of heather-like flowers hanging from all parts of the tree. Then, as summer wanes, they turn into orange-red berries with strange, roughened surfaces. The birds love them.

The dark green, leathery leaves with their silver linings are reminiscent of rhododendron or magnolia leaves. There is a story that the early explorers named Magnolia Bluff in Seattle, along which madronas grow, from this mistaken idea.

The second year the leaves turn yellow or red and fall, making a covering in parks and gardens not appreciated by gardeners. It takes them a long time to disintegrate and become soil.

The tree's beauty captures the eye of all strangers to the Pacific Coast. It is native in the Arboretum.

MAY

Magnolia Sieboldii (M. parviflora)

"No other genus of half-hardy trees and shrubs can boast of so many excellences as the magnolias." The genus was named in honor of Pierre Magnol, a professor of medicine and botany at the old city of Montpellier in southern France.

The two names given to this magnolia are perplexing. It was first described by Siebold in 1845 as *M. parviflora,* a name which had already been used by Blume in 1825 for another plant and was therefore not properly available. Koch's later name of 1853, *M. Sieboldii,* is correct. Thus the confusion.

M. Sieboldii, as it is designated, is a native of Japan, Korea, Manchuria and the province of Anwhei in eastern China. In Japan it grows at high elevations. It may be a small tree or a spreading shrub. It is deciduous.

The blossoms are cup- or sometimes saucer-shaped. The first blooms open when the leaves are young, not fully developed, and continue blooming until the leaves become mature in August. The flowers, about four inches across, are fragrant, white with a flush of pink at the base of each petal. The cup is full of crimson stamens. The so-called Oyama section of Magnolias—to which *M. Sieboldii* belongs—is easily distinguished by the blunt or rounded anthers peculiar to this group. Also this magnolia is different from others by the length of the flower stalk which is unusually long.

The seeds are encased in a crimson cone, semi-pendent, an ornament in itself. I first saw the seed pods in Dr. Tenny's garden on

Magnolia Bluff years ago and have never forgotten my astonishment and admiration.

All magnolias are moisture lovers and detest drought. *M. Sieboldii* is inclined to spread by roots and is easy to increase by layering and seeds. Of course it may be slightly variable from seeds which adds to the enjoyment of growing them.

M. Sieboldii is found by Arboretum Drive among the collection of Magnolias in the Arboretum.

JUNE

Halesia carolina

Halesia is one of the handsome trees native to the United States and while its original home may be Carolina there are three species which grow from western Virginia to Florida and then to Texas. *Halesia carolina* is hardy as far north as Massachusetts.

The tree was named for Stephen Hales who lived from 1677 to 1761. It is generally called Silverbell tree or Snowdrop tree. There are two species that do not vary materially except in stature. *H. carolina* is generally about 15-20 feet high but has been found 30 to 40 feet tall. *H. monticola,* the mountain Snowdrop tree, may attain 80-100 feet in the Great Smoky Mountains.

H. carolina in the Arboretum blooms before the leaves come, in late May or early in June. Both are beautiful and valuable trees to own.

The flowers open while quite small with greenish petals, developing as they grow into a drooping cluster of fragrant, white, bell-shaped corollas, unusual and beautiful.

The trees are rapid growers and in a large garden a planting of a group is charming if not so close together that they may, in time, become a thicket. Such a planting may be seen in the Arboretum by the parking lot at the head of Rhododendron Glen.

G.T.D.

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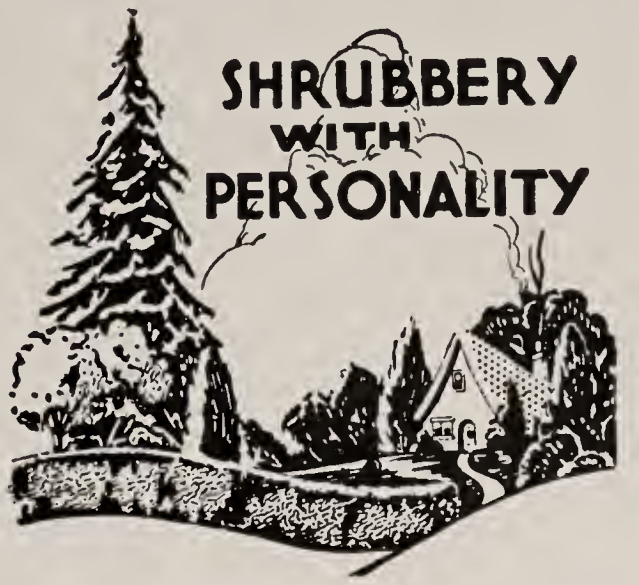

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BOOK REVIEWS

The International Rhododendron Register. Dr. H. R. Fletcher, compiler. (Royal Horticultural Society, London, England, 1958). Price $3.85.

THIS very comprehensive volume is mainly a list of names of rhododendrons and azaleas that have been used in the last 130 years or so.

Many of the names are now obsolete, but according to the revised Rules of Nomenclature, a name that has been once used for a rhododendron or azalea cannot be used again.

Parentage of any plant, when known, is given, and there is a long list of rhododendron breeders and introducers.

For anyone who is now hybridizing rhododendrons or azaleas and is planning to introduce them into commerce, this book is a must, as there is great need to avoid any more duplication of names.

L. E. BRANDT

The Rhododendron and Camellia Yearbook, 1959 (Royal Horticultural Society, London, England. 1958) Price $1.65.

THE current yearbook stresses some of the older gardens in Scotland, in which rhododendrons are featured.

The first is a brief account of the Royal Botanical Gardens, Edinburgh, where a very large number of species is grown.

Since Edinburgh has been the center of classification for rhododendrons since the introduction from China and Burma early in this century of the many species in those lands, it is only natural that they should have a vast collection.

Short articles on other Scottish gardens, at Crarae and Branklyn, Perth, have excellent descriptions of growing conditions, and very fine photographs of specimens growing in these places.

There is an excellent article on growing rhododendrons in limey soil, which will interest those who might have that problem.

Dietrich Hobbie, of Linswege, North Germany, describes the many crosses he has made, striving for colorful plants that will stand extremes of climate.

An article on late flowering rhododendrons and azaleas, and one on the "Wilson 50" Kurume azaleas by Francis Hanger of Wisley are of interest, the latter illustrated with a colored plate taken at the Chelsea Show of 1958.

Articles on the various rhododendron shows, in this country and in the British Isles, together with a number of short articles on the behavior of rhododendrons in various locations, conclude the rhododendron section.

Camellias around the world are noted by several authorities; William Hertrich and Ralph Peer in California, and Francis Hanger, among others.

Lists of awarded camellias and rhododendrons conclude the book.

L. E. BRANDT

Enjoying America's Gardens, by Joan Parry Dutton (Reynal & Co., Inc., New York, N. Y., 1958) Price $5.00.

I have known Joan Parry since her first visit to the Pacific coast and I met her again in England where we visited gardens together so I was not surprised at my pleasure when I read her new book. Her enthusiasm for the gardens in America was as natural and spontaneous as I would have expected.

She tells first of her coming to Mr. Robert Pyle of the Conrad-Pyle Company and her introduction to the making of new roses. Then she begins an on-going jaunt to gardens from Dr. Horace McFarland's rose garden to selected gardens down the eastern coast to Williamsburg and New Orleans.

There are interesting bits of history and botanical touches here and there through the book, all with the warmth and understanding of a loving, knowledgeable gardener.

In Texas the pictures gardens make are different indeed, but appreciation never flags; she finds sidelights that make the telling seem a new-found pleasure.

When in Colorado one may feel the author's love of the mountain country and the wild flowers unconsciously dominate her descriptions. The natural gardens seem the important ones.

Her tribute to San Francisco will be appreciated. "Built on sand and gravel and twice as many hills as Rome," she tells of the city's accomplishments, its love for the beautiful Golden Gate Park and the unique beauty of its surroundings.

She continues her visits to Oregon and Washington gardens but mountain hiking with Mr. and Mrs. Mulligan seems the climax to all of us here in the shadow of Mt. Rainier.

It is a stimulating book. Every gardener will appreciate and enjoy it.

GRACE T. DOWLING

The Amaryllis Manual by Hamilton P. Traub, Ph.D. (The Macmillan Company, New York, 1958). Price $7.50.

THIS book packs into its 338 pages a wealth of information which should please the amateur and the professional grower of amaryllis alike. It is written in a straightforward manner and chapter headings such as "What is an Amaryllis," "Amaryllis Breeding," "Amaryllis as a Cultural Asset," indicate the plan to present concrete and applicable information. In this the book is extremely successful. Equipped with a reliable index it enables the reader to find almost any available practical information on the admirable genus *Amaryllis* L., its species and its hybrids. But the material presented goes far beyond immediate utilitarian aspects.

Dr. Traub, Principal Physiologist in the U. S. Department of Agriculture from 1930 to 1952, has had a half century of experience with Amaryllis and his approaches are those of the scientist as well as the enthusiast. The result is a book which shows a breadth and depth unusual in a "Plant Manual." In an appendix the chromosome numbers of Amaryllis are briefly and succinctly discussed. There is an extensive account (47 pages) of the identification of species and a section containing Dr. Traub's review and suggestions on the knotty problem of nomenclature. There is also a list of commercial sources, a glossary of terms, and a significant bibliography of about 200 titles.

The most stimulating parts of the book deal with the possibilities of hybridization. Dr. Traub

looks at these creatively and with great hope for the future; he envisions increased variety and flexibility of the genus, far beyond the present-day *Leopoldii* and *Reginae* hybrids. There are many small suggestions in this manual which may well become nuclei for a great development in breeding.

This reviewer feels that this book is indeed as advertised by its publishers a "definitive guide" and that it may well become a classic among plant manuals in its combination of specific and general information, of commercially applicable advice and creative suggestions for the lovers of Amaryllis.

E. C. Roosen-Runge

Pruning Handbook" — Plants and Gardens, Brooklyn Botanic Garden, Autumn, 1958. Price $1.00.

ANYONE interested in building a horticultural library at budget prices can do no better than to invest in the Handbooks published by the Brooklyn Botanic Garden, as separate editions of *Plants and Gardens.* Their latest effort, number 28 of the series, is on pruning and, as usual, is a concise yet thorough treatment of a subject which bothers many gardeners. In addition to covering the common or garden varieties of pruning, there are a number of short chapters on the more unusual pruning techniques such as topiary work, root pruning, bush fruit pruning, pruning greenhouse and indoor plants, and a very short discussion on espalier in the modern manner. Each chapter is written by an expert in the field. For instance, Dr. Francis de Vos of the National Arboretum discusses the pruning of broad-leaved evergreens and F. A. Bartlett, founder of the Bartlett Tree Expert Co., writes on pruning trees.

As is normally the case with books written in the east or midwest, we will find certain practices recommended for those areas that are not suitable for us. Even so, the approach is basic and by following the directions and illustrations, which incidentally are plentiful and clear, even the novice gardener can do a workmanlike job of pruning.

J.A.W.

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Some Aspects of Pollination

(Continued from Page 9)

own grave by killing off all their potential pollinators. Fortunately for the plant, this is never the case, Stapelias being desert-forms with a low population density.

Bat pollination was discovered late in the 19th century by a scientist connected with the famous Botanical Gardens in Bogor (Buitenzorg), in western Java. An excellent example of a plant adapted to bats is the sausage-tree, *Kigelia ethiopica,* where the brown fruits seem to be suspended by means of long ropes. The flowers which were there before the fruits ripened were, of course, suspended in the same fashion (fig. 3). This "flagelliflory" facilitates the approach of the bats; it is not uncommon in bat-pollinated plants, although some are "cauliflorous," which means that the flowers are placed on the main stem or on thick branches. Other characteristics of bat flowers are the wide bell shape, the nocturnal flowering habit, an unpleasant mouse-like odor, a lack of bright colors and an abundance of pollen and sticky nectar. The visiting bats are specialists, relying entirely on flowers for their food; they have brushlike tongues and very poorly developed teeth. It is interesting to note that flower-pollinating bats have developed independently in America (where they must be the descendants of vampire bats) and in the Afro-Asian region where they are derived from fruit-eating animals, a very striking case of convergent evolution! In the U. S. A., only two species of flower-

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pollinating bats have been observed in the extreme southwestern part of Arizona. However, there are plenty of regions in this country where one can get at least an idea of the thrilling phenomenon we are discussing. In 1958, Vogel has given conclusive proof that the so-called cup-and-saucer vine *(Cobaea scandens),* which is grown in many American gardens and greenhouses, is in nature bat-pollinated.

The present writer realizes that he has dealt with his topic in a most cavalier way, giving only a snatch here and a glimpse there. Yet it is his hope that the above remarks may act as an eye-opener to many of his readers, making them more keenly aware of the almost incomprehensible beauty of evolution—the process which, by working on the flowers and their pollinators side by side, has given rise to the marvelous natural partnerships which we admire today.

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New or Unusual Plants In the Arboretum

(Continued from Page 19)

with the latter method most successful when the cuttings are taken in the early summer.

Culturewise *Illicium anisatum* would seem to thrive in a sheltered spot with deep loamy soil—just the conditions necessary for growing rhododendrons. The fact that it is a tree in Japan should deter no one from growing it, since it probably will remain a small shrub with us.

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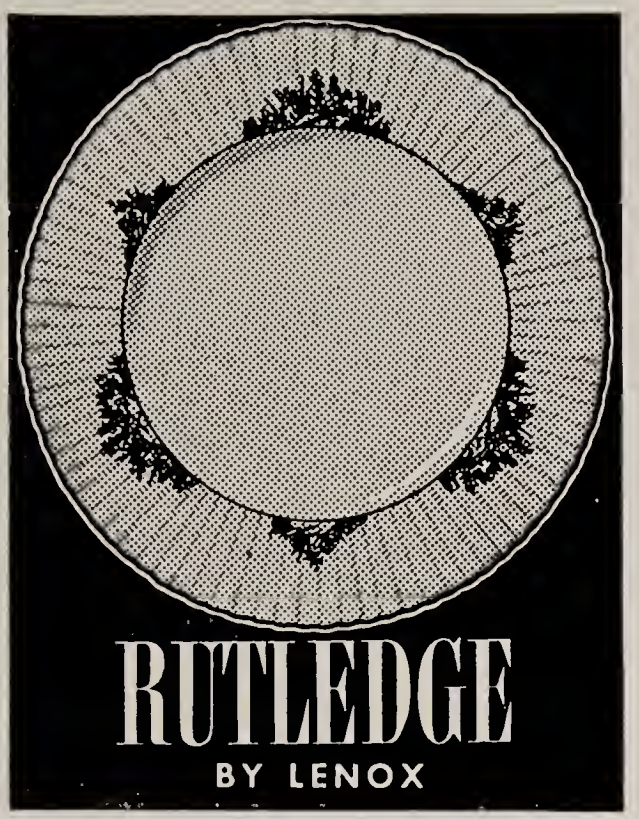

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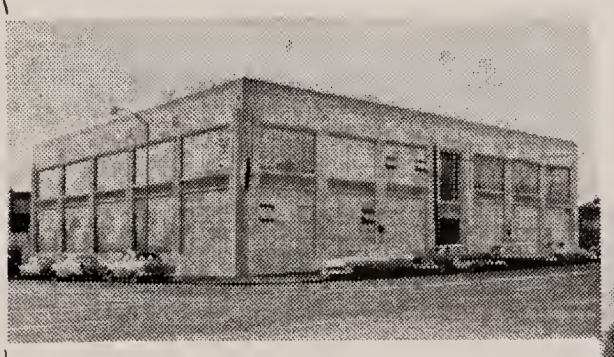

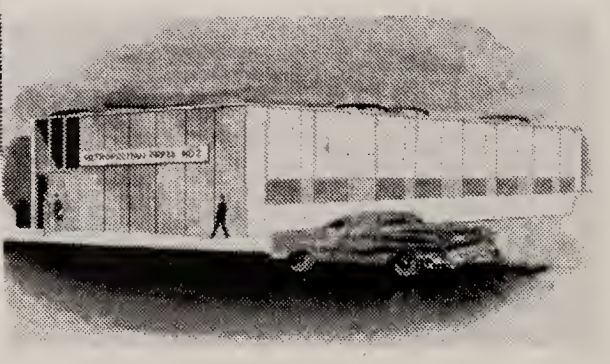

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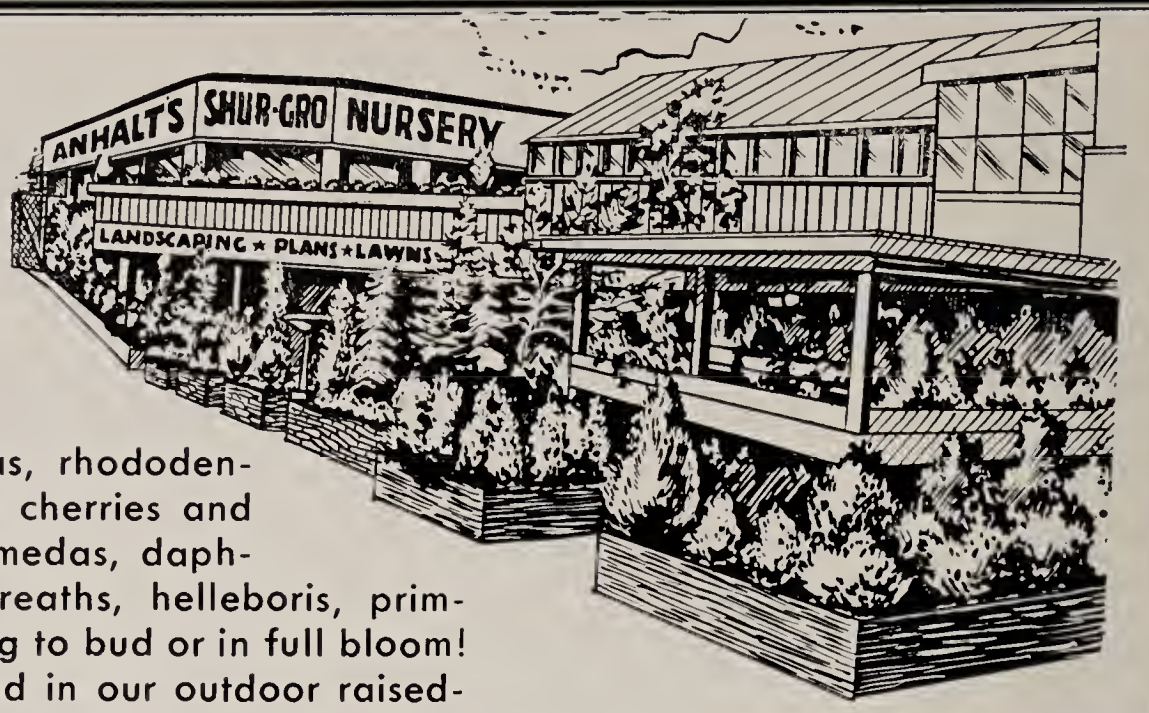

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